

Getting Started With Services on Demand and the Sun™ Open Net Environment — Sun ONE

Executive Overview



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INTRODUCTION

This paper describes the features and benefits of using Services on Demand, as well as a high-level design overview of the various components and technologies used in creating them.

The ability for business and organizations to communicate with each other, between both humans and computers, has lowered costs and decreased reaction times. Business-to-business systems efficiently link suppliers, consumers, and manufacturers. All this has led to improved productivity.

Despite the inexpensive and pervasive communications capabilities provided by the Internet, achieving these improvements is not easy. It has always been a challenge for business applications to talk to each other — there are a vast array of platforms, tools, mechanisms, and processes used by each one. While this was acceptable for business processes occurring within the enterprise or an intranet, it is constraining when trying to operate within a worldwide market. Adding new customers, suppliers, or partners — or rolling out new features to these users — can be difficult, especially if they have their own proprietary systems.

Today, the Web has emerged as a versatile platform for delivering high-value solutions. Services can be accessed from virtually any device, including cellular phones, PDAs, and desktops. Technologies and protocols have been developed that can integrate existing business processes and resources and make them available over the Web.

Sun believes that businesses want an IT infrastructure that supports their current computing environment, while providing a platform that prepares them for future Web-based services. Sun offers many resources to help businesses create Services on Demand, including field-proven reference architectures, market-leading products, and worldwide professional services. Services on Demand can help businesses create a sustainable business advantage by leveraging the Internet to help maximize IT investments, minimize time to market, create new market opportunities, and reduce overall costs.

Sun offers the people, products, and solutions to help your business implement and support Services on Demand. The key is the Sun™ Open Net Environment (Sun ONE), Sun's vision, architecture, platform, and expertise to enable the Services on Demand of today and tomorrow. Based on open Internet standards, Sun ONE offers a comprehensive platform that works with your existing systems and provides superior scalability, manageability, flexibility, security, and reliability. Sun ONE is the delivery platform for Services on Demand. Its advantages include increased ROI on IT assets, the ability to accelerate time to market, and the ability to recruit and retain customers with personalized services.

OVERVIEW

The Internet is a ubiquitous network that connects virtually every business and large numbers of consumers from around the globe, with more and more users getting connected every day. Forrester Research¹ notes that there are 450 million PCs in the world, but the extended Internet, including embedded chips, will increase the Internet population by billions of nodes. For example, Nokia² has announced that they expect to ship 50 million Java™ technology-enabled cell phones by 2002.

Businesses are intrigued by a Web-based approach to computing. As the Web extends to include handheld devices, information and services can be delivered to users anywhere. Properly implemented, Web-based services can be used to leverage and extend your existing IT assets and systems. A computing model based on Services on Demand promises even better cross-business integration, improved efficiency, and closer customer relationships.

There are a number of benefits to using Web-based services to reach customers, partners, and suppliers. These include reduced costs, streamlined operations, and the opportunity for new global partnerships. With new emerging standards, Web-based services are expected to soon provide a platform for global commerce. Clearly, the way to deliver information to users anywhere and on virtually any device is through the Web.

Today, businesses use a variety of applications and services to run their operations.

- **Local Applications:** Applications that run on dedicated PCs, such as office applications. Some of these applications are LAN-based, as well.
- **Client/Server Applications:** Applications that are hosted by a large server. Typically these applications are business-critical – accounting, human resources, manufacturing – and require large database back ends. Client/server applications use both proprietary and Web-based front ends.
- **Web Applications:** Applications that run over the Web, such as e-mail and calendar. These are typically dedicated, single-function applications, and often require dedicated client software. Web applications can be used in-house, outsourced from an application service provider (ASP), or can be a combination of the two.
- **Web Services:** Services that run over the Web and can combine with other services to create a more useful or powerful solution. Web services can be created and used in-house, outsourced from an application service provider (ASP), or can be a combination of the two.

Sun uses the term *Services on Demand* to describe all of these.

1. Forrester Research, The X Internet, Carl D Howe, May 2001.

2. Yahoo! News, “Nokia to Ship 50 Million Java Devices 2002”, September 2001.

WHAT ARE SERVICES ON DEMAND?

Services on Demand are how enterprises use their IT environment to transact and report business operations and to communicate with others — anywhere, anytime, on any device. The Services on Demand concept is the foundation for a modular, flexible, and automated access to digital assets, including computing resources, from virtually anywhere. The Services on Demand vision is of a comprehensive framework, encompassing traditional Net-based services, such as security, authentication, and directory, along with more advanced capabilities, such as virtualized storage and composite services (those created by combining separate services.)

Services on Demand offer businesses a way to improve efficiencies in business software usage. Using Services on Demand not only delivers value and productivity today, but also prepares your IT infrastructure for tomorrow. New protocols are emerging that remove even more barriers for doing business. Global initiatives that will enable components to combine and recombine are nearly complete, providing a new generation of IT services that will evolve as part of today's Services on Demand.

Services on Demand represent evolution, not revolution — they won't eradicate other network and development approaches. In order to make the Services on Demand model attractive, businesses must be able to leverage existing application assets and expose them as services. Rather than connecting to or integrating with existing resources, Services on Demand can leverage and extend them. Vendors are now offering tools and technologies that will reduce the cost, risk, and complexity of moving to this new model.

BENEFITS

Services on Demand facilitate the delivery of anytime computing, anywhere, to anyone, using any device, and offer a number of benefits:

- **Simplify B2B Integration:** By using existing data and standardized protocols, integration efforts are reduced.
- **Reduce Costs:** Services on Demand reduce costs in a number of ways:
 - New applications or services can use existing data, reducing development time. New services can build on existing services, further reducing development time and costs.
 - Services on Demand use an established, widely-used presentation and transport technology – the Web – which does not need to be redesigned.
 - Based on standard protocols, Services on Demand leverage existing training and deployment efforts.
 - Centralized deployment of services can lower total cost of ownership (TCO) by enabling central management of services by IT or external service providers.

- **Streamline Operations:** With standard interfaces and protocols, new features are quickly and easily introduced. Training is minimized.
- **Increase Productivity:** Employees can access their IT assets anytime, anywhere, from any device.
- **Improve Customer Satisfaction:** Services on Demand offer improved customer service and product information capabilities with faster response time.
- **Partnership and Globalization Opportunities:** Through granular exposure of services, businesses can provide specific information and services to users, partners, and suppliers on an *as-needed* basis.
- **Use Technology as a Strategic Weapon:** With customer and supplier interaction occurring over the Web, and the ability to expose different services and resources according to the user, Services on Demand enable businesses to build relationships and mine intelligence interactively.
- **Reduce Time to Market:** New business logic can be delivered more quickly, because developers are freed from complex integration tasks.

SERVICE ON DEMAND COMPONENTS

Simple Web applications, such as e-mail and calendar, can be created and deployed in environments as small as a single server, depending on the expected number of users and the desired level of availability. Many of the components that comprise Services on Demand, including legacy data and applications, are generally more business critical. To serve a worldwide user base requires a scalable, reliable, manageable, and available platform. Even if developing a small pilot project, the resulting service should be capable of scaling to a global audience.

When designing “on-demand” services, it is important to consider the overall architecture, including the following:

- **Development Tools:** Businesses should select a comprehensive integrated development environment (IDE) that is designed to support all the aspects of a services architecture. This includes integration facilities to wrap existing applications – C, C++, Fortran, ERP packages, and so on – into XML services that can ultimately be delivered as Web Services on Demand where they are needed. The IDE should also facilitate a team-based environment and graphical component assembly. Service creation tools should be knowledgeable about the specifics of the underlying architecture, shielding developers from having to understand how and where to deploy different components. Finally, the development tools should be configurable and extensible, enabling the ability to plug in the capabilities needed.
- **Platform:** The underlying hardware and operating environment should be capable of meeting both immediate and future demands. Mature cluster technology is necessary to deliver reliability, availability, and scalability, while administration and management tools are required to control costs and maximize resources.

- **Legacy Systems Integration:** Tools and technologies are needed to connect Services on Demand to existing systems and applications. Services on Demand must comfortably coexist with the enormous investments that most enterprises have made in legacy applications, which often represent the backbone of their automated business processes. Service integration components may be needed to span multiple firewalls, requiring them to support multiple transport protocols, such as HTTP, Java Message Queue, FTP, SMTP, and others.
- **Service Presentation and Delivery:** Tools and technologies that connect, locate, deliver, and present content to users are another requirement. Portal products can enable this functionality across multiple device types, such as text or voice, and segment services to different user communities. More advanced Services on Demand systems may also provide the capabilities to aggregate content from different sources, enable users to personalize their experience, and notify users of new content or services.
- **Transactions, Productivity, and Commerce:** Applications and services such as office functionality, and business services for B2X productivity are necessary for both user and enterprise productivity. This can include e-mail, calendar, and other productivity applications such as word processing and spreadsheet. Commerce functionality may be required to buy, sell, bill, or otherwise facilitate online financial transactions.

TECHNOLOGIES

In addition to mature Web protocols – HTTP, HTML, and SSL – a number of technologies are emerging that support the new Web services model. While not all are fully defined standards, they are maturing quickly with broad industry support. The key technologies are as follows:

- **ebXML (e-business XML)** defines core components, business processes, registry and repository, messaging services, trading partner agreements, and security.
- **SOAP (Simple Object Access Protocol)** is a protocol for initiating conversations with a UDDI service. SOAP makes object access simple by allowing applications to invoke object methods, or functions, residing on remote servers. A SOAP application creates a request block in XML, supplying the data needed by the remote method as well as the location of the remote object itself.
- **UDDI (Universal Description, Discovery, and Integration)** is a protocol for describing available Services on Demand components. This standard allows businesses to register with an Internet directory that will help advertise their services, so companies can find one another and conduct transactions over the Web. Internal UDDI directories can assist internal development efforts.
- **WSDL (Web Service Description Language)**, the proposed standard for how a Web service is described, is an XML-based service that defines the service interface and its implementation characteristics. WSDL is referenced by UDDI entries and describes the SOAP messages that define a particular Web service.

JAVA TECHNOLOGIES

Technologies based on the Java programming language have been at the center of Web development for many years, from back-end servers to consumer devices. Many Services on Demand are enabled by Java technologies such as Enterprise JavaBeans™ (EJB™), Java 2 Platform, Enterprise Edition (J2EE™), Java Servlet, and JavaServer Pages™ (JSP™) technology.

There are emerging Java technologies and specifications, known as Java APIs for XML, that are enabling the creation of Services on Demand using the familiar JSP and EJB component technologies for the Java platform. These include technologies and protocols for working with XML, directories, repositories of services, and messaging, as well as transitioning existing services.

LIBERTY ALLIANCE PROJECT

The Liberty Alliance Project (www.projectliberty.org) is a relatively new organization that was formed to create an open, federated, single sign-on identity solution for the digital economy using any device connected to the Internet. Membership is open to all commercial and non-commercial organizations. Sun Microsystems, along with over 30 other businesses and organizations representing over one billion customers, is a charter member in the Liberty Alliance Project.

The Liberty Alliance Project is committed to protecting consumer privacy and security while providing personalized services and products in an open environment. Sun represents its extensive developer community, customers, and employees, who will all play a role in developing products based on the new standards.

ROLLING OUT SERVICES ON DEMAND

Services on Demand can be the heart of your business's profitability and competitiveness. While deploying them is a multi-year effort, Services on Demand can return many benefits, while providing a smooth, clear path to a computing platform that will serve your enterprise's needs for years to come. As businesses evaluate ways in which Services on Demand can improve productivity, save costs, and create new opportunities, they should consider the following steps.

GETTING STARTED

- Evaluate the Services on Demand model as a more efficient means of providing common services for internal users. Use mature technologies – for simple services, this may mean HTML and SSL, while more business-critical services should use more capable environments such as the J2EE platform. A J2EE application server transparently manages much of the complexity associated with scalability, including security, transactions, and multithreading. Using a J2EE application server can help shorten development and deployment time by enabling developers to focus their efforts on business logic, not system plumbing.
- Architect for any device or service. If a service is a success, users will want to access it from wherever they are, using all kinds of devices. As well, design each service such that it can be used by other services. For example, a single authentication service should be used by all other services. Creating an authentication capability unique to each service would be inefficient and costly, while sharing directory data and policies across all services would be very efficient.
- Define communities and policies. One of the more difficult tasks in creating Services on Demand is determining who can use them, as well as the rules for using them.
- Use a Web portal as the design center. With a single sign-on, users can access all services from a single place, seeing only those services they have access to. Portals provide a common point of integration, keeping costs low and productivity high.

MOVING FORWARD

- As a business gains more experience and develops more Web services resources, an internal Web services registry should be developed. This will promote code reuse, and provide experience in working with UDDI technology and protocols. Process servers can be used as a means of assembling individual services into new, more powerful services without developing new components.
- Expose Services on Demand outside your firewall. Engage partners, suppliers, and even customers in these efforts.
- Constantly seek feedback from all users. Services on Demand can evolve incrementally, and without requiring users to download new code or causing developers to rewrite the underlying architecture.
- Get involved with the emerging standards for your industry. Join a standards body, or closely follow the proceedings.

SUN OPEN NET ENVIRONMENT — SUN ONE

In order to meet the needs of always-on, mission-critical customers and transcend simple task-specific Services on Demand, the next generation of services must evolve into offerings that go well beyond what is currently available. Today most services are capable of a simple, specific function, such as weather or traffic information. The real benefits emerge when services are combined and recombined to meet individual users' needs instantaneously.

Sun ONE is an open framework that supports Services on Demand today and lays the foundation for the Services on Demand of tomorrow. It enables organizations to create, assemble, and deploy Services on Demand now and into the future. Sun ONE provides a better computing model that is:

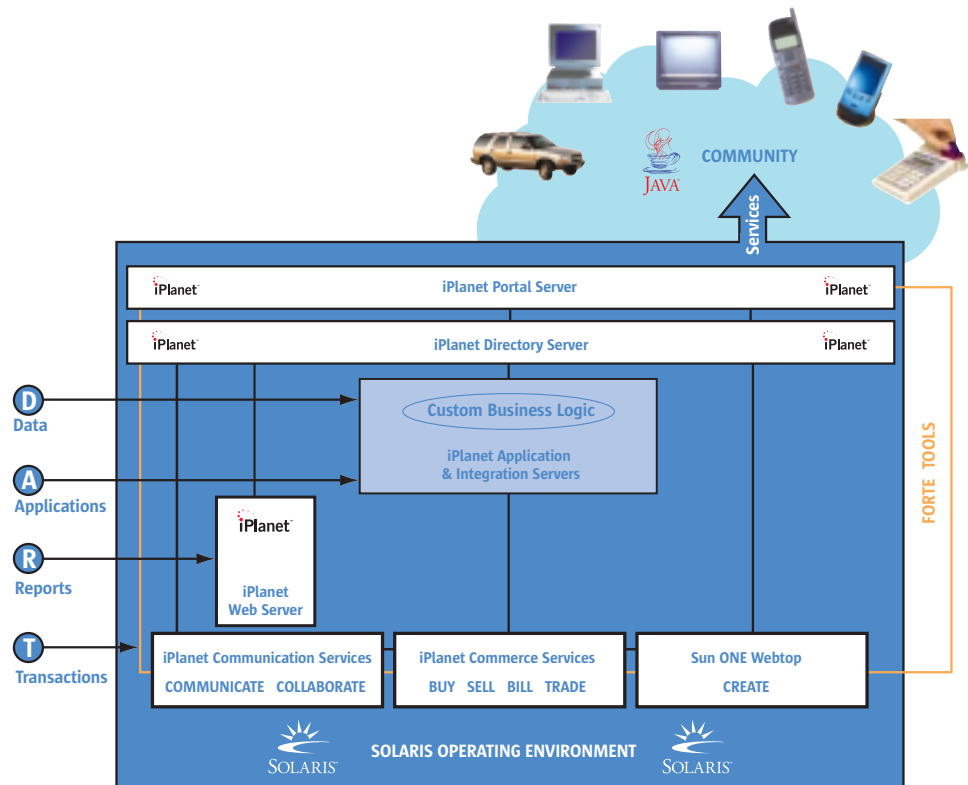
- **Integratable:** Sun ONE connects and integrates with existing systems. Businesses are free to use existing components anywhere in the Sun ONE framework.
- **Complete:** Sun ONE is a comprehensive platform, and includes the tools, products, and technologies to create, assemble, and deploy Services on Demand.
- **Standards-based:** Sun ONE adheres to publicly accepted standards. Sun actively participates in standards bodies to ensure that the specifications are relevant for Sun customers. Sun delivers implementations consistent with these standards, ensuring interoperability with standards-compliant components from other vendors.
- **Evolving:** Many of the key elements are still being defined in standards bodies, and Sun is playing a major role in shaping them. Adding new capabilities is an evolutionary – not revolutionary – process because business build on their existing assets. This protects existing technology investments.

Sun ONE can help solve your immediate problems now with market-leading products. In addition, it can also help your business evolve to the next level of Services on Demand, providing them anytime, anywhere, to any device.

BASIC ELEMENTS OF THE SUN ONE FRAMEWORK

Sun has defined an open software architecture to support interoperable Services on Demand. The Sun ONE architecture addresses important issues such as privacy, security, community, and identity. It defines practices and conventions to support situational context, such as client device type and user location. And it supports systems that can span multiple networks, including the traditional Web, wireless Web, and home networks. The architecture is designed to ensure that Services on Demand, developed using any tool, running on any platform, can seamlessly interoperate.

The Sun ONE platform is specifically engineered to support the information lifeblood of the modern enterprise: data, applications, reports, and transactions (DART). Whether mainframe/terminal-based or deployed on the Internet, collectively, these four resources represent the IT needs of a modern enterprise.



- Data:** A Services on Demand architecture must be able to present and aggregate data that's meaningful to an organization's communities – customers, partners, suppliers, employees, and so on. Such personalized content is delivered through portals. The key underlying mechanism by which user access to information is controlled is called a directory. Directories house all the user data – who they are, what privileges they have, and what part of your business they need to interact with. The Sun ONE platform's state-of-the-art directory offerings let businesses use the DART framework to provide specific solutions for virtually any business problem.
- Applications:** Applications in a DART can run on the iPlanet™ Application Server. It uses existing databases and applications, giving you access to the legacy pieces in your environment via the iPlanet Integration Server. It also provides a scalable place to run Java technology-based business logic – a key advantage of the Sun ONE platform.

- **Reports:** Tracking the use and value of your organization's services is critical. Sun ONE offers the fastest Web server on the planet to provide meaningful reports. In fact, some of the highest volume Web sites in the world use Sun's iPlanet Web Server to keep up with constantly rising demand.
- **Transactions:** The range of transactions ensures that your communities can do useful things with the information assets available to them, such as buy, sell, bill, or trade products and services, communicate with others within or outside their community, or do routine daily work more efficiently.

The goal of the Sun ONE platform is to provide a more flexible, cost-effective environment where DARTs can be developed, deployed, discovered, and utilized. This goal is realized through the use of open standards, robust software, and hardware components that create an integratable stack for implementing enterprise-class, Internet-accessible services.

THE SUN ONE PLATFORM

The Directory

The first step in turning the raw information assets into a valuable business asset is to create a directory of both the assets and the community. This is the role of the **iPlanet Directory Server**, which sits in the middle of every connection from the assets to the community.

The directory contains an enterprise's most valuable assets, including customer, employee, partner, and supplier information. Directories can also contain information on non-human entities, such as products, internal resources, and manufacturing equipment capable of providing services. The iPlanet Directory Server suite of software provides the capabilities to fulfill this central role by delivering the software platform necessary to collect, distribute, manage, and protect the most valuable core information assets of an enterprise.

The Portal

The **iPlanet Portal Server** provides a connection from the user in a particular community to the enterprise. The iPlanet Portal Server content aggregation capabilities enable the aggregation of any HTML or XML encoded content as well as virtually any application that can be run on any major server OS, such as Microsoft Windows and X Windows-based applications running on the UNIX® operating system. Content and application services are defined as channels in the iPlanet Portal Server, which can be combined into a flexible, seamless, customizable, browser-based user interface.

The iPlanet Portal Server is integrated into the directory framework for user authentication and group membership information. Once a user is logged in, the iPlanet Portal Server provides personalized information and authorized services.

Complementary packages provide additional functionality to the iPlanet Portal Server, including secure communications, intelligent searching, and mobile access. Together, these features provide flexible, secure access and personalized, customized interfaces to an enterprise's user communities.

Application and Integration Servers

Applications, including integration with existing business IT assets, provide the business logic that make up Services on Demand. DART relies on a powerful, yet flexible engine to drive the delivery of these services across the Sun ONE service grid. Built on open standards, the **iPlanet Application Server** readily interfaces with other elements in the Sun ONE architecture — from applications to basic directory and security services.

The iPlanet Application Server offers two significant capabilities to the DART framework. First, it enables access to legacy pieces of the business IT environment. This includes valuable assets, such as databases, and business-critical applications, such as customer relationship management (CRM). Second, it provides a scalable platform to run Java technology-based business logic. The application server provides a robust J2EE execution environment for service components — for example, validating an address and storing it as a user's preferred shipping address — that make up the services offered by an enterprise to support its communities.

The iPlanet Application Server is built on a cluster architecture, so it is a highly available platform. It features horizontal scalability — multiple Java runtime environments and multiple CPUs are managed as one. This also enables developers to focus more on business logic and less on implementation, further increasing productivity.

The iPlanet Application Server is enhanced by two additional packages. The **iPlanet Integration Server** is a workflow-based engine that enables a business analyst to pull together workflows across legacy applications and create services out of them. This allows an enterprise to integrate all of its internal services and make them available for use as Services on Demand. The **iPlanet Integration Server, B2B Edition** is an Internet commerce-exchange application that enables businesses to automate and manage the processes that occur between organizations over the Internet and existing private networks.

The application server, therefore, provides a robust environment for the execution of business logic, integrating of internal legacy application services and external data services.

Reporting

As with other DART components, the **iPlanet Web Server** offers high performance, reliability, and scalability in a product based on open standards. This award-winning product is the leader for powering public Web sites. By offering built-in services such as load balancing, the iPlanet Web Server minimizes the IT workload required to build and maintain the reporting capabilities of Services on Demand.

The extensibility of the iPlanet Web Server enables it to adopt new protocols as they are finalized and approved. This feature not only protects the Web server investment from obsolescence, it also provides a facility for transcoding content to future requirements.

By providing a robust, scalable, adaptable platform for assembling and displaying information, the iPlanet Web Server is an excellent reporting environment. This offers maximum flexibility for future requirements, while delivering a stable platform for today's services.

Personal and Business Transactions

There are two kinds of Web service transactions — person-to-person and machine-to-machine.

- Person-to-person transactions are the most heavily used Web service – billions of messages are now sent every month. **iPlanet Communication Services** have proven scalability, from single CPU servers up through platforms that supports millions of users across multiple network types. iPlanet Communication Services, including the **iPlanet Messaging Server** and **iPlanet Calendar Server**, provide person-to-person capabilities.
 - The iPlanet Messaging Server offers an easy-to-use Web mail interface for remote access to any Web browser, as well as seamless integration with the iPlanet Portal Server mail client for secured anywhere, anytime access.
 - The iPlanet Calendar Server has provisions for personal as well as business calendars. It also includes facilities for scheduling enterprise-wide events, group events, and resources such as conference rooms. These calendars can be combined in flexible ways to provide personalized, context-relevant scheduling.
- Buying, selling, inquiring, and billing constitute the machine-to-machine communication aspects of the Sun ONE architecture. **iPlanet Commerce Services** offer enterprises and service providers comprehensive commerce functionality, including procurement, selling, bill presentment and payment, marketplaces, and trade facilitation. Leveraging the other elements in Sun ONE, these off-the-shelf e-business packages feature the capabilities required for automating business-to-business transactions.

With the open and integratable technologies provided by Sun ONE, service providers can focus on the value they add – delivering innovative Services on Demand – rather than on building and integrating the underlying platforms or porting to new devices.

Development Tools

Forte™ Tools offer an integrated development environment (IDE) for the Java, C, C++, and FORTRAN languages. Forte Tools feature automatic loading of just the capabilities that the developer needs. This flexibility enables developers of all types to seamlessly access the plug-ins they need and thereby speed the development of a diversity of Web-based service components. This robust IDE can be used to develop, test, package, and deploy new functionality to meet the ongoing needs of the enterprise.

The Foundation

- The **Solaris™ 8 Operating Environment** is the foundation of Sun ONE. Its capabilities are essential to the security, predictability, and quality of Services on Demand created using Sun ONE. As the foundation for Sun systems, the Solaris Operating Environment enables your IT organization to deliver on the promise of massive scale, continuous real-time computing, and secure systems – while increasing service levels, reducing risk, and decreasing costs. And because it's tightly integrated with the Java 2 Platform, it will remain at the forefront of operating environment offerings.

Delivering Services on Sun ONE

One of the significant differentiators of Sun ONE is Sun's ability to deliver it. More than an architecture or specification, Sun ONE consists of market-leading products that work together to create a platform that offers massive scalability, continuous availability, and real-time flexibility. For example, Sun's reference architectures offer lab- and field-proven designs that demonstrate an environment where millions of subscribers – both wireline and wireless – use e-mail, calendar, and directory services in a segmented firewall environment. More than just point products, Sun products work together to deliver the performance and reliability your business needs, today and tomorrow.

Sun offers many resources that can help your enterprise embrace Services on Demand. These include:

- **Sun Professional Services:** Thousands of service professionals have been assisting, architecting, developing, deploying, and managing Services on Demand for businesses in over 40 countries. Using our field-proven methodologies and technologies, Sun consultants can design and implement the policies and best practices to meet unique business goals.
- **SunTone™ Program:** To provide customers with a means for identifying high-quality sources for Web-based services, Sun has established the SunTone Certification and Branding program. These documented standards for excellence provide guidelines for architecting and operating required levels of service. SunTone certification can be applied to all aspects of a Web service, including the infrastructure, service provider, applications, security, and management practices. The SunTone Architecture Methodology, developed by Sun Professional Services, is based on many years of extensive experience designing and delivering Internet-based business solutions for thousands of customers across all industries. The SunTone program promotes progress toward the goal of WebTone – available, reliable Services on Demand.
- **iForce™ Initiative:** Sun's global iForce initiative brings together Sun and its global industry partners to deliver proven solutions designed to help customers – ranging from startups to large enterprises – harness the power of the Internet and drive business advantage. iForce solutions differ from competitive, single-company offerings because the iForce community provides a rich array of products, programs, and services.

- iForce Ready Centers: Located around the world, iForce Ready Centers assist Sun customers with everything from brainstorming the technological options for creating and IT infrastructure to proof-of-concept demonstrations to actual pilot programs. An iForce solution is a pretested aggregation of best-of-breed applications that is scalable, customizable, and adheres to open standards.

Sun has been a leader in providing Internet products and technologies for years. Sun ONE is the platform to leverage and extend existing Web service capabilities to Services on Demand in the very near future.

FUTURE DIRECTIONS

Sun's vision recognizes that businesses must support multiple styles of computing and service delivery, including dedicated applications, Web applications, Web services, and others as they become available. Sun further recognizes that the majority of their customers today are running dedicated applications and are moving to Web applications. As Web service technology evolves, businesses want an IT infrastructure that supports their current computing environment while providing a platform that prepares them for future, more intelligent Web-based services.

Sun ONE provides the vision, architecture, products, and expertise to deliver Services on Demand today and into the future. Sun's vision is that the following key elements will help evolve Services on Demand into the future:

- Federated Identity: Sun's vision of Services on Demand includes the concept of federated identity. One of the tasks of the Liberty Alliance Project is to deliver and support an identity solution for the Internet that enables single sign-on for consumers as well as business users in an open, federated way. Federated identity also includes decentralized authentication and open authorization from any device connected to the Internet, from traditional desktop computers and cellular phones to TVs, automobiles, credit cards, and point-of-sale terminals.
- Context: Services on Demand need to understand the context in which they are being used or what they are being called upon to do. This context, stored in XML, can provide information on where the user is (home, office, or downtown at 6th and Main), what their preferences are (short text, visuals, voice), what type of device they are using at different times (PC at work, PDA on the road), and so on. Services are delivered in accordance with a user's intentions. Future context specifications will also come out from the Liberty Alliance Project.
- Dynamic Supply Chain: As the Sun ONE platform incorporates the ebXML specification, dynamic commerce will become reality. A dynamic supply chain (e.g. auctions that will occur without human intervention) will create a highly efficient supply/demand model providing enormous cost benefits to enterprises that will leverage this technology.

RESOURCES

- Sun — www.sun.com
- Sun ONE — www.sun.com/sunone
- Forte — www.sun.com/forte
- iPlanet Products — www.iplanet.com
- Java Technology — java.sun.com
- Java Community Process™ — jcp.org
- Solaris — www.sun.com/solaris
- Sun ONE Webtop — www.sun.com/webtop
- Sun Professional Services — www.sun.com/services/sunps
- SunTone Program — www.sun.com/suntone
- iForce Initiative — www.sun.com/iforce
- Dot-Com Builder: dcb.sun.com
- Reference Architectures — www.sun.com/architectures-platforms
- Wireless @ Sun — www.sun.com/wireless
- Liberty Alliance Project — www.projectliberty.org
- ebXML — www.ebxml.org
- OASIS — www.oasis-open.org
- W3C (XML, XSLT, XMLP, HTML) — www.w3.org
 - SOAP — www.w3.org/TR/SOAP
 - SOAP with Attachments — www.w3.org/TR/SOAP-attachments
 - UDDI — www.uddi.org
 - VoiceXML — www.voicexml.org
 - WSDL — www.w3.org/TR/wsdl
- UN/CEFACT — www.unece.org/cefact



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